nuclear technology®

EDITOR:

ROY G. POST

Department of Nuclear Engineering
University of Arizona
Tucson, Arizona 85721

ASSOCIATE EDITOR:

KARL WIRTZ

Kernforschungszentrum Karlsruhe
Institut für Neutronenphysik und Reaktortechnik
75 Karlsruhe, Postfach 3640, Germany

VOLUME 31
October, November,
December 1976

AMERICAN NUCLEAR SOCIETY
244 EAST OGDEN AVENUE • HINSDALE, ILLINOIS 60521 USA

Copyright © 1976 by American Nuclear Society, Inc., Hinsdale, Illinois 60521

CONTENTS OF VOLUME 31

OCTOBER 1976—VOL. 31, NO. 1

TECHNICAL PAPERS

REACTORS

7 Power-Distribution Control by Absorber Deficit Compensation / *Herbert Finnemann, Helmut Moldaschl*

12 Load-Follow Demonstrations Employing Constant Axial Offset Power-Distribution Control Procedures / *P. J. Sipush, R. A. Kerr, A. P. Ginsberg, T. Morita, L. R. Scherpereel*

32 A Comparison of the Deuterium-Tritium Neutron Wall Load Distributions in Several Tokamak Fusion Reactor Designs / *David L. Chapin, William G. Price, Jr.*

48 Evaluation of Subcooled Water Thrust Forces / *Stephen W. Webb*

FUEL CYCLES

53 Economic Alternatives for the Long-Term Use of Plutonium Produced in Light Water Reactors / *K. Hnilica, H. P. Holley, K. Lahner, H. Schmale*

FUELS

62 Behavior of Molybdenum in Mixed-Oxide Fuel / *G. Giacchetti, C. Sari*

MATERIALS

70 Caustic Stress-Corrosion Behavior of Fe-Ni-Cr Nuclear Steam Generator Tubing Alloys / *I. L. W. Wilson, F. W. Pement, R. G. Aspden, R. T. Begley*

85 Notch Effect on the Tensile Properties of Fast-Reactor-Irradiated Type 304 Stainless Steel / *Robert L. Fish*

96 Residual Cold Work and Its Influence on Tensile and Creep Properties of Types 304 and 316 Stainless Steel / *V. K. Sikka, R. W. Swindeman, T. L. Hebble, C. R. Brinkman, M. K. Booker*

115 Temperature and Fluence Limits for a Type 316 Stainless-Steel Controlled Thermonuclear Reactor First Wall / *E. E. Bloom, F. W. Wiffen, P. J. Maziasz, J. O. Stiegler*

(Continued)

CONTENTS OF VOLUME 31 *continued*

OCTOBER 1976—VOL. 31, NO. 1

(Continued)

INSTRUMENTS

123 Detection of Sodium Boiling in Liquid-Metal Fast Breeder Reactors by Monitoring Neutron Noise Signals for Oscillatory Components / *Joachim Ehrhardt*

RADIATION

133 Prediction of Time-Dependent Neutron Fluxes Encountered in Pulsed-Neutron Uranium Logging Experiments / *James H. Renken*

TECHNICAL NOTE

MATERIALS

140 Some Effects of Preinjected Helium and Irradiation Temperature in Void Formation in Aluminum Irradiated with Aluminum Ions / *M. L. Sundquist, J. M. Donhowe*

DEPARTMENTS

1 Authors

144 Book Reviews

147 Editor's Book Reviews

148 Letters to the Editor

CONTENTS OF VOLUME 31 *continued*

NOVEMBER 1976—VOL. 31, NO. 2

TECHNICAL PAPERS

REACTORS

159 Maximum Neutron Wall Loadings in Beam-Driven Tokamak Reactors / *D. L. Jassby, H. H. Towner*

164 Research on a 2700-MW(th) Pebble-Bed Reactor for a Helium-Turbine Power Plant / *H. Jochem Rütten, Eberhard Teuchert*

172 Tritium Diffusion in Fusion Reactor Blankets / *J. M. Mintz, T. S. Elleman, K. Verghese*

FUELS

183 Fabrication, Properties, and Irradiation Behavior of U/Pu Particle Fuel for Light Water Reactors / *Helfrid W. H. Lahr*

191 Crushing Strength of High-Temperature Gas-Cooled Reactor Fuel Particles / *W. J. Lackey, D. P. Stinton, L. E. Davis, R. L. Beatty*

RADIOACTIVE WASTE

202 Incentives for Partitioning High-Level Waste / *H. C. Burkholder, M. O. Cloninger, D. A. Baker, G. Jansen*

MATERIALS

218 Hydrogen and Oxygen Behavior in Liquid Sodium (Experimental) / *Hiroji Katsuta, Kazuo Furukawa*

232 Effect of Neutron Irradiation on the Microstructure and Properties of Titanium-Stabilized Type 316 Stainless Steels / *E. E. Bloom, J. M. Leitnaker, J. O. Stiegler*

SHIELDING

244 Shielding Calculation Techniques for the Design of Plutonium Processing Facilities / *T. C. Gillett, R. S. Denning, J. L. Ridihalgh*

(Continued)

CONTENTS OF VOLUME 31 *continued*

NOVEMBER 1976—VOL. 31, NO. 2

(Continued)

INSTRUMENTS

250 Neutron Radiography of Fast Transient Processes / *G. S. Okawara, A. A. Harms*

TECHNIQUES

257 Reactor Flux Measurements Using Thermoluminescent Dosimetry / *John W. McKlveen, Michael Schwenk*

264 Design and Performance of a Microwave Strain Measuring System for Materials Tests / *T. Roger Billeter, L. D. Blackburn*

TECHNICAL NOTES

MATERIALS

276 Observations on the Luminescence of α-Al_2O_3 (Synthetic Sapphire) in a Reactor Environment / *R. N. Davie, Jr., J. F. Davis III, R. T. Schneider*

TECHNIQUES

279 Direct Measurement of Cesium Adsorption on High-Temperature Surfaces Using Radioactive Tracers / *R. K. Collier, C. E. Backus*

DEPARTMENTS

153 Authors

CONTENTS OF VOLUME 31

DECEMBER 1976—VOL. 31, NO. 3

TECHNICAL PAPERS

REACTORS

287 Experimental Study on Fast-Neutron Streaming Through a Grid-Plate Shield of a Liquid-Metal Fast Breeder Reactor / *Yoshiaki Oka, Hiroaki Wakabayashi, Shigehiro An, Ikunori Suzuki*

297 Molten Fuel-Coolant Interaction During Hypothetical Accidents in Light Water Reactors / *Victor Teschendorff, Adly Barsoum Wahba*

306 Fast Reactor Transfer Functions with Special Reference to the Nonlinearities and the Spatial Dependence of the Heat Transfer Process / *L. Caldarola, P. Ferranti, F. Mitzel*

REACTOR SITING

319 Recent State Laws Regulating Power Facility Siting / *Victoria A. Evans*

326 Civil Defense Implications of the U.S. Nuclear Power Industry During a Large Nuclear War in the Year 2000 / *Conrad V. Chester, Rowena O. Chester*

CHEMICAL PROCESSING

339 Reactivity Measurements Under Conditions Typical to Fuel Element Dissolution / *S. R. Bierman*

FUELS

348 The Effect of Variable Thermal Conductivity in Thermal-Hydraulic Calculations / *David A. Rehbein, Roger W. Carlson*

357 Effect of Pellet Cracking on Light Water Reactor Fuel Temperatures / *P. E. MacDonald, J. Weisman*

MATERIALS

367 Alloy 800 for Liquid-Metal Fast Breeder Reactor Steam Generators / *M. Julien*

375 Updated Measure of Radiation Damage Exposure / *K. Shure*

(Continued)

CONTENTS OF VOLUME 31

DECEMBER 1976—VOL. 31, NO. 3

(Continued)

DEPARTMENTS

283 Authors

385 Book Review

386 Volume 31 Indexes